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Citrus Leafminer

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FIG. 1

Type Pest: chewing insect (*Phyllocnistis citrella* Stainton)

Type Metamorphous: complete (egg, larva, pupa & adult stages)

Period of Primary Occurrence: March through October

Plants Affected

- Various types of citrus grown in USA including oranges, mandarins, lemons, limes, grapefruit and other varieties as well as closely related plants including kumquats and calamondins
- In its native ranges, other species within Rutaceae (the rue or citrus family)


FIG. 2

Identifying Characteristics of Insect Pest

EGG STAGE

- Females lay eggs evenings and at night
- Eggs are laid singly on either side of leaf but typically on the underside along the midvein
- Each egg looks like a water droplet
- Immediately after hatching (2 – 10 days depending on weather conditions), larva immediately enters the leaf tissue and begin feeding


FIG. 3

LARVA & PUPA STAGES

- Fully developed larvae are minute (1/8" or 3 mm), translucent greenish-yellow, and located inside the leaf mine
- Larvae go through four stages of molts (instars) and development to pupa takes from 5 – 20 days
- Larvae pupate within their mine (tunnel) in a special pupal cell at the leaf margin, under a slight curl of the leaf
- Pupa stage lasts 6 – 22 days


FIG. 4

ADULT STAGE: Adult stage of citrus leafminer is a moth

- Adults generally are too minute to be easily noticed
- Active dusk to dawn
- Life cycle takes 2 – 7 weeks to complete, depending on temperature and other weather conditions

Description / Symptoms

- Newly emerged leaflets (known as a flush) are preferred feeding sites
- Larvae may also form mines in succulent stems and sometimes fruit (Fig. 6)
- Larvae feed by creating mines (shallow tunnels) on the underside of young leaves
- Mine patterns (tunnels) do not cross, creating a serpentine/snake-like pattern (Fig. 3 & 4)
- Severely damaged leaves typically become curled and distorted (Fig. 1 & 2)
- As a larva increases in size, its mine or tunnel becomes more wide and visible
- Larval excrement forms a thin, central thread-like trail within the mine (Fig. 5)

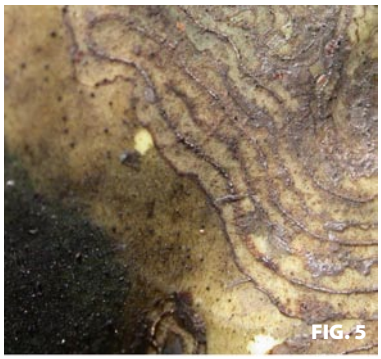
FIG. 5

Best Management Practices (BMP)

MATURE CITRUS *(more than 4 years old)*

- Even though the spring flush on mature trees (4 years and older) can be heavily damaged by the citrus leafminer and look unsightly, yield and tree growth of most varieties will be not be significantly affected
  - Control by insecticides is generally not worthwhile except in trees that produce multiple flushes during the growing season

YOUNG CITRUS *(less than 4 years old)*

- Citrus leafminer is likely to cause damage in young trees because their growth can be retarded by severe infestations
  - However, even when infestations of the citrus leafminer are heavy on young trees, trees are unlikely to die

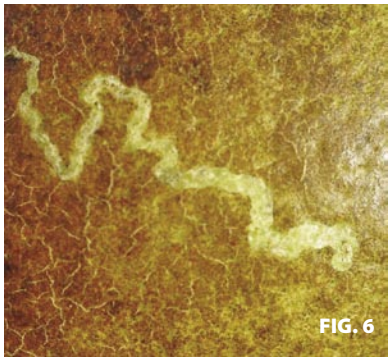
FIG. 6

CULTURAL CONTROL

- Citrus leafminer moths are attracted to new flush of citrus trees. Avoid pruning live branches more than once a year, so that the cycles of flushing are uniform and short. Once the leaves harden, the pest will not be able to mine the leaves
  - Do not prune off leaves damaged by citrus leafminer because undamaged areas of the leaves continue to produce food for the tree
  - Do not apply nitrogen fertilizer at times of the year when leafminer populations are high and flush growth will be severely damaged

CHEMICAL CONTROL

- Insecticidal control is difficult to achieve because larvae are shielded within mines in a leaf
  - Overuse of insecticides also induces resistance in the insect pest and is detrimental to its natural enemies
  - Foliar sprays may be applied to protect new flushes of growth in young (less than 4-years-old) citrus when the leaves are most vulnerable to damage
  - However, the best foliar insecticides confer only 2 – 3 weeks of control, and insecticides cannot be relied upon for effective control of heavy leafminer infestations
- Horticultural oil sprays (including Neem Oil) applied to new leaf growth may inhibit egg laying, but must be repeated on a weekly basis during each flush cycle
- Insecticides containing Spinosad as the active ingredient has recently been introduced- Green Light's Lawn & Garden Spray with Spinosad
  - Ferti-lome's Borer, Bagworm, Leafminer
  - Tent Caterpillar Spray contain Spinosad and are available at several local nurseries and garden centers
  - This insecticide needs to be applied on the top and under the leaves to be effective. The spray has to be applied at 2 week intervals and also after a hard rain
- Dormant oil can help deter egg-laying by female moths, but it does not stop adult females from laying eggs on a leaf that did not get the spray (ie., thorough coverage of leaves is important). Do not spray Spinosad until you see damaged leaves usually in late April or early May as earlier sprays only waste money and spray

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